

REMARKS

Favorable reconsideration of this application, as presently amended and in light of the following discussion, is respectfully requested.

Claims 68-72, 74-79, 85, 87-93, and 98 are presently active in this case. Claims 1-67, 73, 80-84, 86, and 94-97 were previously canceled, and Claims 69-72 stand withdrawn from consideration as being directed to a non-elected invention. The present Amendment amends Claims 68 and 88 without introducing any new matter.

In the outstanding Office Action, Claim 88 was rejected under 35 U.S.C. § 112, second paragraph; Claims 68, 78, 85, 87, 90-93, and 98 were rejected under 35 U.S.C. § 102(b) as being anticipated by Aspar (U.S. Publication No. 2003/0077885); Claims 68 and 89 were rejected under 35 U.S.C. § 102(b) as being anticipated by Joly et al. (U.S. Patent No. 6,159,323; hereinafter “Joly”); Claims 68, 74, 75, and 89 were rejected under 35 U.S.C. § 102(e) as being anticipated by Nemoto et al. (U.S. Patent No. 7,195,988; hereinafter “Nemoto”); Claims 77 and 79 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Aspar; and Claims 68, 74, 75, 77-79, 85, and 87-93 were rejected under 35 U.S.C. § 103(a) as being unpatentable over MacNamara et al. (U.S. Patent No. 6,841,848, hereinafter “MacNamara”) in view of Kim et al. (U.S. Patent No. 6,790,748; hereinafter “Kim”).

Regarding the rejection under 35 U.S.C. § 112, second paragraph, Claim 88 is amended to recite that the eliminating takes place before a surface penetration of the first wafer for a purpose of assembling. Applicants respectfully submit that Claim 88 clearly points out the claimed subject matter. Accordingly, it is respectfully requested the rejection under 35 U.S.C. § 112, second paragraph, be withdrawn.

Further, Applicants respectfully traverse the rejection of Claims 68, 78, 85, 87, 90-93, and 98 under 35 U.S.C. § 102(b) as being anticipated by Aspar.

Amended Claim 68 is directed to a method of assembling a first wafer onto a second

wafer. The first wafer includes a lower layer having no circuits and components and an upper transplant layer arranged at least under a frontal side of the first wafer. The transplant layer has at least one of circuits and components. The method includes eliminating material from the upper transplant layer and the lower layer from the frontal side of the first wafer in an outside peripheral area of the first wafer, over a thickness less than an entire thickness of the first wafer, but greater than an entire thickness of the upper transplant layer, after the at least one of circuits and components have been formed in the upper transplant layer. The method also includes assembling the upper transplant layer of the first wafer onto the second wafer via molecular adhesion after the eliminating.

Applicants respectfully submit that Aspar fails to disclose each of the features of Claim 68. For example, Aspar fails to disclose eliminating material in an outside peripheral area of the first wafer.

Aspar Figures 2A-2I illustrate steps in a method of making an embrittled substrate, and in Figure 2G, Aspar “shows the breakdown of the handle 17 supporting the thin layer 15, into elements 21.”¹ In particular, Aspar explains: “The handle may then be broken down into elements corresponding to electronic components and which can be transferred onto different supports.”² Thus, the step shown in Aspar at Fig. 2G merely represents cutting the wafer apart into plural components 20 by cutting between the components, and Aspar fails to show or otherwise suggest any elimination of material in an outside peripheral area of the wafer. Accordingly, Aspar fails to disclose, in Fig. 2G or elsewhere, “eliminating material ... in an outside peripheral area of the first wafer,” as recited in Claim 68.

Therefore, it is respectfully submitted that Claim 68 and claims depending therefrom patentably define over Aspar.

In addition, Applicants respectfully traverse the rejection of Claims 68 and 89 under

¹ Aspar at ¶¶ [0065] - [0075], Fig. 2G.

² Aspar at ¶ [0074].

35 U.S.C. § 102(b) as being anticipated by Joly, with respect to amended Claim 68.

As discussed above, Claim 68 is directed to a method of assembling a first wafer onto a second wafer via a molecular adhesion. Applicants respectfully submit that Joly fails to teach or suggest each feature of Claim 68. Furthermore, Applicants respectfully traverse the assertion in the Office Action that Joly Fig. 2 discloses the claimed eliminating material from a frontal side of the first wafer.³

According to Joly, “trenches 26 are formed (by etching) in the initial substrate 10 starting from its free surface 28 obtained after thinning.”⁴ Further, Joly discloses that an electronic circuit 12 is formed in substrate 10.⁵ Thus, as shown in Joly at Fig. 2, the trenches 26 are actually formed from the face opposite to that on which the electronic circuit 12 is formed. Thus, Joly only discloses the opposite of the claimed feature, and Joly fails to suggest “eliminating material ... from a frontal side of the first wafer,” as recited in Claim 68.

In addition, Joly discloses substrate 32 is assembled with substrate 10 through a layer 30 of bond material.⁶ Accordingly, Joly also fails to teach or suggest “assembling ... the first wafer onto the second wafer via molecular adhesion,” as recited by Claim 68.

Therefore, it is respectfully submitted that Claim 68 and claims depending therefrom also patentably define over Joly.

Applicants respectfully submit the rejection of Claims 68, 74, 75, and 89 under 35 U.S.C. § 102(e) as being anticipated by Nemoto is rendered moot.

This application claims foreign priority to French Patent Application 03/50674 (the “‘674 priority document”), which was filed on October 14, 2003. An English translation of the ‘674 priority document is filed herewith to perfect the priority claim. Nemoto was filed January 6, 2004, which is later than the October 14, 2003 filing date of the ‘674 priority

³ Office Action at 5.

⁴ Joly at col. 5:48-50.

⁵ Joly at col. 5:5-7.

⁶ Joly at col. 6:22-24.

document. Therefore, Nemoto is disqualified as prior art with respect to the present application under 35 U.S.C. § 102. Accordingly, Applicants respectfully request the rejection of Claims 68, 74, 75, and 89 under 35 U.S.C. § 102(e) as being anticipated by Nemoto be withdrawn.

Additionally, Applicants respectfully traverse the rejection of Claims 77 and 79 under 35 U.S.C. § 103(a) as being unpatentable over Aspar.

Claims 77 and 79 depend from Claim 68, which is believed to patentably define over Aspar as discussed above. Accordingly, Claims 77 and 79 also patentably define over Aspar. Therefore, it is respectfully requested that rejection also be withdrawn.

Furthermore, Applicants respectfully traverse the rejection of Claims 68, 74, 75, 77-79, 85, and 87-93 under 35 U.S.C. § 103(a) as being unpatentable over MacNamara in view of Kim.

Applicants respectfully submit that MacNamara and Kim fail to teach or suggest each of the features of Claim 68. According to MacNamara, device and handle wafers 9, 10 are stacked together to form a composite wafer 1 by anneal bonding.⁷ After the composite wafer 1 is formed, a “device layer 2” is formed from a device wafer 9 by etching the device wafer 9 down to a thickness t .⁸ It is only after the step of anneal bonding device and handle wafers 9, 10 together, and the etching of device wafer 9 to a device layer 2 that the micro-mirrors 5 (i.e., the devices) are formed into the device layer 2.⁹ MacNamara also explains that a plasma etch is performed to form peripheral recesses 25 that are not covered by a photoresist layer 23 to a depth D .¹⁰ Therefore, according to MacNamara, there are no devices in the device wafer 9 at the time of forming the recesses 25. Accordingly, MacNamara fails to teach or suggest “eliminating material from the upper transplant layer and the lower layer from the frontal side

⁷ MacNamara at cols. 8:53-63, 9:55-58, Fig. 10.

⁸ MacNamara at col. 10:5-9, Fig. 11.

⁹ MacNamara at col. 10:9-17, Figs. 1, 2, 11.

¹⁰ MacNamara at col. 9:32-37, Figs. 8, 9.

of the first wafer ... after the at least one of circuits and components have been formed in the upper transplant layer,” as recited by Claim 68.

Applicants respectfully submit that Kim fails to supply the claimed features lacking in the disclosure of MacNamara. Kim describes eliminating material on a lateral part of a substrate 102 containing a device layer 110. However, as disclosed by Kim at Figs. 4 and 5, tool 145 etches layer 102 from a back side of substrate 102, which is opposite to the side on which the components are made. Thus, Kim fails to disclose or suggested “eliminating material ... from the frontal side of the first wafer,” as recited by Claim 68.

Additionally, according to Kim, tool 145 does not etch the layer 110 in which the components are made.¹¹ Furthermore, Kim discloses eliminating material after assembling the substrates.¹² Thus, Kim also fails to teach or suggest “eliminating material from the upper transplant layer and the lower layer from the frontal side of the first wafer ... after the at least one of the circuits and components have been formed in the upper transplant layer,” and “assembling the upper transplant layer of the first wafer onto the second wafer ... after said eliminating material,” as recited in Claim 68.

Therefore, Applicants respectfully submit that Claim 68 and claims depending therefrom also patentably define over MacNamara and Kim, whether taken individually or in combination.

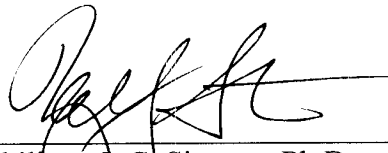
¹¹ Kim at Figs. 4, 5.

¹² Kim at col. 4:35-67, Figs. 3-6.

Consequently, in light of the above discussion and the present amendment, Claim 68 and claims depending therefrom are believed to be in condition for allowance and an early and favorable action to that effect is respectfully requested.

Respectfully submitted,

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